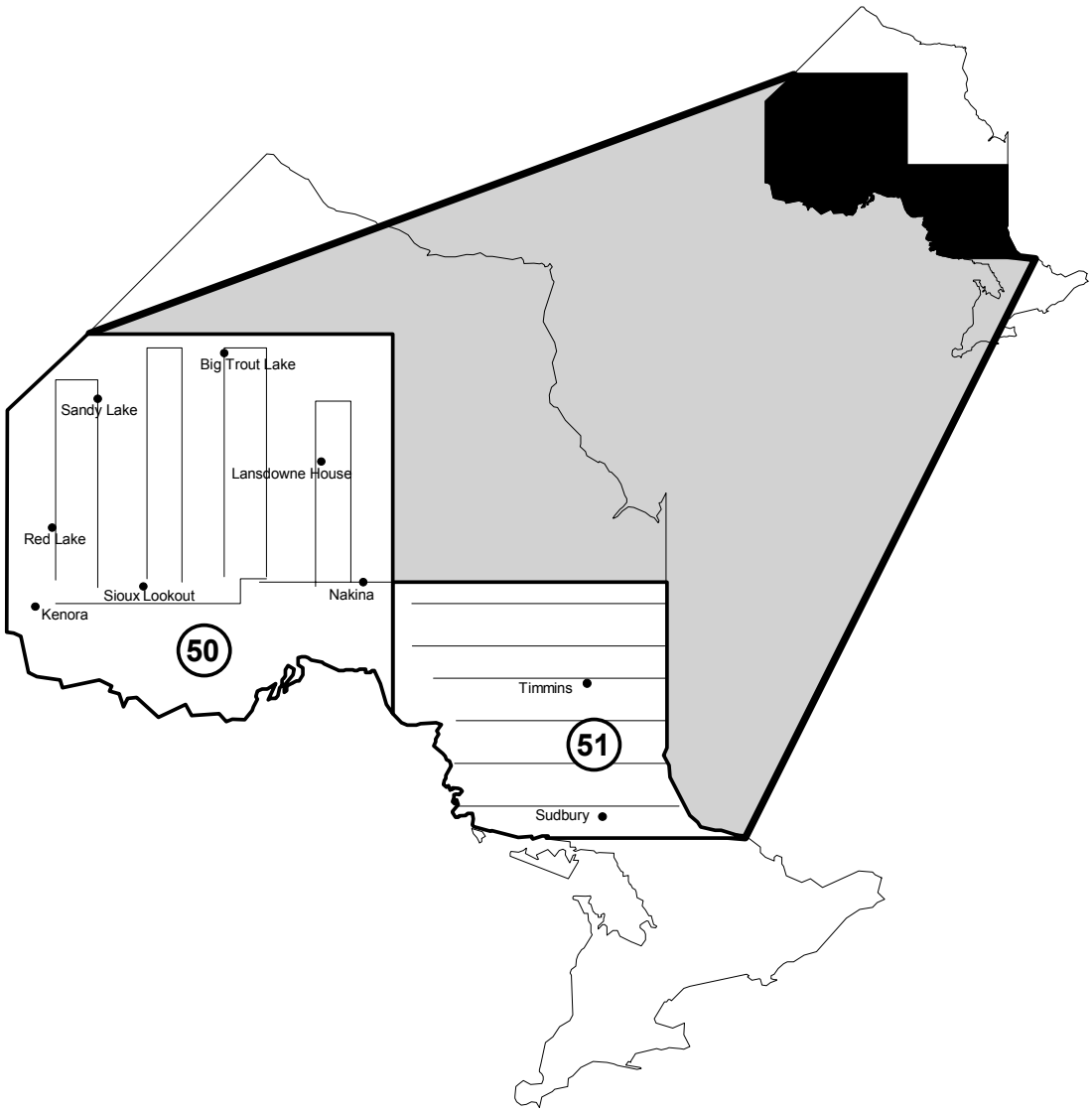
WESTERN AND CENTRAL ONTARIO

Waterfowl Breeding Population Survey

2003



The data presented in this report are preliminary. Final estimates are available from the U.S. Fish and Wildlife Service, Office of Migratory Bird Management, Patuxent Wildlife Research Center, Laurel, Maryland 20708-4016.

TITLE: Waterfowl Breeding Population and Habitat Survey for Western and Central Ontario

STRATA SURVEYED: 50 - Western Ontario
51 - Central Ontario

DATES: 14 – 29 May 2003
15 – 19 May: Central Ontario - Stratum 51
21 – 27 May: Western Ontario - Stratum 50

DATA SUPPLIED BY: United States Fish and Wildlife Service (USFWS)

AERIAL CREW:

Pilot/Observer	William I. Butler, Service Aviation Manager, USFWS
Pilot/Observer	Karen S. Bollinger, Flyway Biologist, USFWS

ABSTRACT: The 2003 Waterfowl Breeding Population and Habitat Survey of Western and Central Ontario was conducted from 14 May to 29 May. Survey design and coverage was consistent with previous years. Weather conditions, which were warm and dry during the winter, continued through the spring survey period. The resulting normal to slightly early break-up in this boreal forest habitat (i.e., permanent ponds) made for good waterfowl nesting conditions. In Western Ontario, the estimate for total duck populations was the third highest on record (1.7 million) and 93% above the long-term mean (1955-2002). In contrast, the estimate for total duck populations in Central Ontario was slightly below the mean (-10.7%); this mean being based on all the13 previous years that the survey has been flown (1990-2002). In both areas, however, these estimates for total ducks mask the wide discrepancies noted between not only dabblers and divers, but individual species as well.

Selected information for 2003 is presented below:

Western Ontario – Stratum 50

	2003 Indices (thousands)	Percent Change From 2002	Percent Change From 1993-2002 mean (10 yr)	Percent Change From 1955-2002 mean
Mallard	443.8	83.6	94.9	96.3
Black Duck	23.9	-47.4	-26.0	- 6.3
Green-winged Teal	39.6	-37.6	- 8.2	45.1
Ring-necked Duck	350.5	-39.7	24.7	251.3
Goldeneyes	42.9	-67.0	-79.7	-64.9
Bufflehead	7.2	-65.3	-60.1	-64.9
Mergansers	666.6	14.9	115.6	306.7

Central Ontario – Stratum 51

	2003 Indices (thousands)	Percent Change From 2002	Percent Change From 1990-2002 mean (13 yr)	Percent Change From 1955-2002 mean
Mallard	139.8	160.6	90.4	n.a
Black Duck	41.1	-24.1	-26.3	n.a
Green-winged Teal	21.5	10.0	-36.8	n.a
Ring-necked Duck	92.7	-30.7	-25.8	n.a
Goldeneyes	24.4	-72.2	-74.0	n.a
Bufflehead	4.9	-65.0	-71.4	n.a
Mergansers	152.2	-27.1	38.8	n.a

METHODS: The procedures used in conducting this year's annual survey are described in the *Standard Operating Procedures for Aerial Waterfowl Breeding Population and Habitat Surveys in North America*, Section III, revised 1987. Complete coverage of both strata were flown this year (i.e., all transects and segments were surveyed).

Western Ontario (Stratum 50), first surveyed in 1955, is part of the traditional Breeding Waterfowl and Habitat Survey. This area continued to be surveyed annually through 1973, except for 1971. After a lapse of 12 years, this survey was resumed in 1986 and has continued annually to the present. Surveys in Central Ontario (Stratum 51) were not initiated until 1990, however. Expansion of this survey was in response to initiatives of the Black Duck Joint Venture (under the North American Waterfowl Management Plan). 2003 marks the thirty-sixth and fourteenth year of surveys to determine breeding waterfowl population numbers in Western and Central Ontario, respectively.

Both waterfowl and habitat data were collected using an aerial onboard computerized recording system. The survey program, written by John I. Hodges (USFWS-Alaska), provided the basis for both recording observations and transcribing the data into electronic format. This software also integrated each bird observation with point locations from the Global Positioning System unit (GPS) in the aircraft. This allowed each waterfowl observation to be matched with a latitude/longitude position.

It is known that birds are missed during aerial surveys by fixed wing aircraft. In order to account for this under estimation, visibility correction factors (VCF's) are applied to the data. In this survey area, these correction factors are based on comparisons of observations made by fixed wing (i.e., this survey) with those made by helicopter in selected segments. Comparison data from 23 segments flown in Central Ontario during previous years were used in applying VCF's to this year's data. Also note that data was imputed during the 13 years that the survey was not flown in Western Ontario. The Bayesian statistics used in calculating the VCF's and an explanation of how imputed data are calculated are explained in "*A critical review of the aerial and ground surveys of breeding waterfowl in North America"* (Biological Science Report #5, National Biological Service, June 1995).

Changes were made in the aerial survey crew for the first time in four years. The primary pilot/observer, Bill Butler, who has flown this survey for the past eight years, was joined this year by Karen Bollinger. Karen has had experience in flying these May surveys since 1999, however; having flown in the Western Dakotas, Montana, Manitoba, and Saskatchewan.

On 14 May, the crew departed Maryland enroute to the survey area in N729, a Cessna 206 amphibian aircraft. Stratum 51 was completed in 5 straight days of flying from 15 – 19 May and 22.6 hrs of flight time. Stratum 50 was completed in 7 straight days of flying from 21-27 and 35.3 hrs of flight time. The only day that surveys were not flown occurred on 20 May; and this was due to weather (i.e., rain, low ceilings, low visibility). Upon completion of the survey, N729 was ferried to Minneapolis, Minnesota on 29 May for a 100 hr inspection, change out of floats from 4000's to the 3450's and exchange of the main wing and tip fuel tanks for Sierra fuel tanks. The entire survey, including transit time, took 16 days and a total of 70.5 flight hours.

WEATHER AND HABITAT:

STRATUM 50: Located in west central Ontario, this stratum lies north of Lake Superior, west of James Bay, and south of Hudson Bay. This boreal forest habitat has numerous lakes of all sizes occurring throughout. It is characterized by rolling terrain with elevations of up to 2000 feet in the south gradually decreasing to below 1000 feet in the north. As one moves north in the stratum, lakes tend to decrease in size and rivers begin flowing north to Hudson Bay. Human population is sparse throughout the stratum, and even more so north of 51.5° N latitude where villages become more infrequent and the limited roads are mostly those used for logging. Industry in the stratum includes limited mining operations, agriculture in the southwestern section, and extensive logging resulting in intermixed stands of old and new stands concentrated mostly in the southern one-third. Fly-in fishing is also a major industry in this stratum, especially in the northern two-thirds where the habitat has been relatively untouched by man.

Permanent water areas dominate the stratum with many large lakes connected by streams, marshes, and muskegs. Two notable marsh areas with relatively higher concentrations of ducks were observed on the survey lines flown in this stratum. These are located on the Cobham River (Transect 5:16; 53.2°N 94.0°W) and the Albany River (Transect 3:5; 51.5°N 89.0°W). The marsh area located on the Albany River is rather extensive. The potential exists for this area to hold large numbers of ducks during fall migration and it might present an opportunity for pre-season banding. In general, water and habitat should vary only slightly over time with seasonal phenology being the most important factor in annual production.

STRATUM 51: This stratum in central Ontario lies north of Lake Huron, east of Lake Superior, south of James Bay, and west of the Quebec border along the Ottawa River. The stratum is characterized by rolling terrain in the east, central, and northern sections with more severe terrain in the south and west. Habitat can be described as boreal forest, mixed with some farmland in the center and east (commonly referred to as the clay belt). Logging is common throughout the area, resulting in mixed old and new growth. Extensive mining operations are also visible on the landscape, but are concentrated mainly in the southern half. Permanent water areas are numerous with many large to small lakes connected by streams, marshes, and muskegs. Water and habitat should vary only slightly over time.

WEATHER: Summary of average temperatures and precipitation for both strata for the previous year are summarized below. Data was obtained from Environment Canada's Green Lane web site (www.msc.ec.gc.ca). The months of June, July, and August define the summer season; September October, November, fall; December, January, February, winter; and March, April, May, the spring season.

	Summer 2002	Fall 2002	Winter 2002-03	Spring 2003
Temperature				
Stratum 50	+1.5°C	-1.5°C	+1.0°C	+1°C to ave
Stratum 51	+1.5°C	-1.5°C	average	ave to -1°C
Precipitation				
Stratum 50	-20% to average	-20 to -30% to average	-40% to average	-20 to -40%
Stratum 51	-20% to average	-20% to average	-50% to average	-30% to average

Slightly cooler temperatures than average (-1.5ºC) during fall 2002 were followed by average to slightly warmer than average temperatures (+1.0ºC) during both winter and spring. Precipitation in the area since summer 2002 has been mostly below average; with the greatest discrepancy (up to 50% below average) occurring during both winter and spring.

HABITAT: Habitat conditions in Central and Western Ontario were rated good to fair. Timing of the survey was considered excellent. All lakes and streams viewed during the survey were ice free, except for Big Trout Lake in the northern portion of Stratum 50. Even though black rotten ice covered approximately 70% of this lake, waterfowl was observed on the open edges and leads. Breakup in both strata was earlier than last year and closer to normal. Leaves, which were just budding out during the survey in Central Ontario, were slightly farther along during the survey in Western Ontario, which was flown after Central Ontario. Weather throughout the survey was mostly dominated by a large high-pressure system that resulted in above seasonal temperatures (highs up to 20°C) and mostly clear skies. Rain occurred on only one day during the survey. Below average rainfall in the survey area over the last year was most notable in the area of Sioux Lookout, Ontario (51°N 92°W) and north where lakes levels were very noticeably reduced. Nevertheless, nesting conditions were considered good due to the warm and dry conditions throughout the spring survey period.

BREEDING POPULATION ESTIMATES

STRATUM 50: The total duck population estimate for Western Ontario decreased 6.2% from the 2002 estimate, but was 32.9% and 93.4% above the 10-year mean and long-term means, respectively (Table 2, Figure 1, Appendix 1). The total dabbling duck population estimate was substantially higher than in 2002, and in comparison to both the 10-year and long-term means (45.9%, 54.9%, and 64.3%, respectively). These higher estimates were due almost totally to higher numbers of mallards observed. Diving duck estimates were all lower than in 2002; only ring-necked duck estimates were above the 10-year or long-term mean (24.7% and 251.3%, respectively). High numbers of mergansers were also observed in 2003. Mergansers estimates were 11.1%, 100.7%, and 277.0% above 2002 and the 10-year and long-term means, respectively. Canada geese estimates were down

from 2002 estimates (-25.6%), close to the 10-year mean (-7.7%) and above the long-term mean (44.4%).

Albany River Area; In a meandering survey of the marsh area along the Albany River (~51.5°N 89.0°W), a total of 197 ducks and 6 Canada Geese were observed. These included 88 mallards, 12 American black ducks, 3 ring-necked ducks, 10 goldeneyes, 6 bufflehead, and 78 mergansers. These numbers are not included in the stratum summaries.

STRATUM 51: The total duck population estimate for Central Ontario decreased 18.3% from the 2002 estimate, and 10.7% from the 13-year mean (Table 3, Figure 2, Appendix 2). Dabbling duck estimates were substantially higher than in 2002 (86.5%); but only slightly higher than the 13-year mean (17.9%). These higher estimates were mainly due to higher numbers of mallards, although higher numbers of American black ducks were also observed in comparison to 2002 (24.1%). Diving duck estimates were down over 50% in comparison to both 2002 (-54.5%) and the 13-year mean (-51.1%). Mergansers estimates were below those of 2002 (-27.1%, but above the 13-year mean (+38.8%). Canada geese estimates were substantially higher than both the 2002 estimate (161.5%) and the 13-year mean (297.1%).

CONCLUSIONS

STRATUM 50: Since 1986 when surveys were resumed in Western Ontario, estimates of duck populations have generally been higher than during the first 19 years of the survey (1955 – 1973). This trend continued during the current year, 2003. Estimates for total ducks in 2003 were the third highest on record. 1996 and 2002 represent the number one and two record year duck estimates for this survey area, respectively. In 2003, merganser estimates were the highest ever recorded, while both mallard and ring-necked duck estimates were the third highest. This same higher trend in recent years is not seen for American black ducks, however.

STRATUM 51: Estimates for total ducks in Central Ontario were close to the average over the last 13 years. This average total duck estimate resulted from extremes in individual species estimates, however. Estimates for mallards and mergansers were the second and fourth highest on record, while those for American black ducks and ring-necked ducks were the third and fourth lowest. Canada geese estimates for 2003, the highest on record, were more than double the previous recorded high estimate recorded in 1999 and 2002.

Table 1. Survey design and coverage for Western and Central Ontario, May 2003.

Survey Design	50	51
Square miles in stratum	176,609	78,680
Linear miles in sample	2,358	1,512
Number of segments in sample	131	84
Number of segments flown	131	84
Expansion factor	299.59	208.15

Table 2. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) and stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for Western Ontario.

	Stratum					% Change From		
Species/Ponds	50	2003 Total	2002 Total	10-Year Mean	Long-Term Mean	2002	10-Year Mean	Long-Term Mean
Ducks								
Dabblers								
Mallard	443.8	443.8	241.8	227.6	226.1	83.6%	94.9%	96.3%
Am. black duck	23.9	23.9	45.4	32.3	25.5	-47.4%	-26.0%	-6.3%
Gadwall	3.5	3.5	0.0	0.4	1.1	--	900.0%	224.3%
Am. wigeon	2.7	2.7	5.4	15.6	20.8	-50.0%	-82.8%	-87.1%
Am. green-winged teal	39.6	39.6	63.5	43.1	27.3	-37.6%	-8.2%	45.1%
Blue-winged teal	6.0	6.0	0.0	16.3	12.4	--	-63.1%	-51.6%
N. shoveler	0.0	0.0	0.0	0.0	1.0	--	--	-100.0%
N. pintail	0.0	0.0	0.0	0.0	2.0	--	--	-100.0%
Subtotal	519.5	519.5	356.0	335.4	316.2	45.9%	54.9%	64.3%
Divers								
Redhead	0.0	0.0	0.0	0.0	0.4	--	--	-100.0%
Canvasback	0.0	0.0	0.0	0.0	4.9	--	--	-100.0%
Scaups	0.0	0.0	4.6	15.3	78.6	-100.0%	-100.0%	-100.0%
Ring-necked duck	350.5	350.5	580.9	281.1	99.8	-39.7%	24.7%	251.3%
Goldeneyes	42.9	42.9	129.9	211.7	122.3	-67.0%	-79.7%	-64.9%
Bufflehead	7.2	7.2	20.8	18.1	20.5	-65.3%	-60.1%	-64.9%
Ruddy Duck	0.0	0.0	0.0	1.5	1.7	--	-100.0%	-100.0%
Subtotal	400.7	400.7	736.2	527.7	328.3	-45.6%	-24.1%	22.1%
Miscellaneous								
Long-tailed duck	0.0	0.0	0.0	1.5	0.5	--	-100.0%	-100.0%
Eiders	0.0	0.0	0.0	0.0	0.0	--	--	--
Scoters	3.8	3.8	23.2	23.5	13.4	-83.6%	-83.8%	-71.7%
Mergansers	666.6	666.6	580.0	309.1	163.9	14.9%	115.6%	306.7%
Subtotal	670.4	670.4	603.2	334.0	177.8	11.1%	100.7%	277.0%
Total Ducks	1590.5	1590.5	1695.4	1197.1	822.3	-6.2%	32.9%	93.4%
Canada Goose	47.1	47.1	63.3	51.0	32.6	-25.6%	-7.7%	44.4%
Am. coot	0.0	0.0	0.0	0.0	0.9	--	--	-100.0%

Appendix 1. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Western Ontario.

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	41.2	183.8	69.4	144.0	127.3	196.9	163.6	362.1	185.7	220.0
Am. black duck	6.8	18.4	0.0	9.0	18.6	10.2	30.4	59.9	19.4	29.7
Gadwall	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	4.3
Am. wigeon	17.8	10.3	0.0	0.0	0.0	3.2	16.0	32.0	11.1	16.3
Am. green-winged teal	0.0	0.0	0.0	0.0	9.6	0.0	5.9	14.2	19.2	24.1
Blue-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4
N. shoveler	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
N. pintail	0.0	9.6	0.0	0.0	9.7	6.8	3.0	0.0	3.5	0.0
Subtotal	65.8	222.1	69.4	153.0	168.1	219.0	218.9	468.2	238.8	301.8
Divers										
Redhead	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	32.3	0.0	121.5	7.3	0.0	1.7	1.9
Scaups	16.6	252.8	74.8	69.1	92.9	73.7	83.7	61.5	60.9	78.3
Ring-necked duck	40.2	1.5	0.0	0.0	0.0	1.9	1.9	99.2	67.6	34.2
Goldeneyes	13.5	39.1	0.0	41.4	227.1	42.8	71.8	190.0	124.0	77.2
Bufflehead	8.3	16.0	0.0	16.9	6.1	16.2	9.3	17.4	25.8	0.0
Ruddy Duck	0.0	0.0	0.0	0.0	0.0	0.0	25.0	10.0	0.0	0.0
Subtotal	78.6	309.3	74.8	159.7	326.0	262.2	198.8	378.1	280.0	191.6
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	15.8	12.4	1.4	0.0	0.0	6.1	2.0	0.0	2.8	0.0
Mergansers	94.0	71.6	68.0	165.8	53.5	160.7	85.3	108.9	109.5	89.1
Subtotal	109.8	84.0	69.4	165.8	53.5	166.9	87.4	108.9	112.3	89.1
Total Ducks	254.1	615.4	213.6	478.5	547.6	648.1	505.0	955.2	631.1	582.4
Canada Goose	17.0	14.8	0.0	0.0	0.0	9.3	0.0	15.3	5.3	0.0
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	53.5	154.7	171.2	122.2	136.6	155.8	226.1	189.1	227.2	234.9
Am. black duck	17.4	7.1	18.6	45.7	34.2	15.5	25.9	46.6	43.8	25.7
Gadwall	0.0	0.0	11.2	0.0	0.0	0.0	1.9	0.0	1.8	1.9
Am. wigeon	19.8	18.5	4.2	35.7	10.0	0.0	28.2	10.3	24.9	31.1
Am. green-winged teal	0.0	11.0	12.5	5.0	0.0	50.4	21.8	7.6	7.4	26.0
Blue-winged teal	0.0	0.0	7.6	6.1	0.0	47.9	8.8	0.0	0.0	13.3
N. shoveler	0.0	0.0	5.2	0.0	0.0	0.0	0.5	0.0	0.0	1.0
N. pintail	0.0	1.7	0.0	4.8	3.1	4.6	3.0	5.6	6.2	2.8
Subtotal	90.8	193.1	230.6	219.5	183.9	274.3	316.3	259.1	311.3	336.8
Divers										
Redhead	0.0	0.0	0.0	0.0	1.8	0.0	1.0	0.0	0.0	1.0
Canvasback	0.0	0.0	1.9	0.0	0.0	0.0	5.9	0.0	0.0	5.6
Scaups	30.9	80.8	58.6	111.1	71.3	59.2	90.7	117.3	48.3	90.6
Ring-necked duck	35.6	162.0	60.0	2.0	18.3	35.6	46.8	16.9	32.7	56.2
Goldeneyes	5.0	70.2	53.4	347.3	102.7	65.0	101.0	153.4	181.3	102.2
Bufflehead	3.1	4.3	6.6	51.3	36.0	84.9	21.6	18.6	28.3	22.6
Ruddy Duck	0.0	0.0	0.0	3.5	0.0	3.5	1.8	0.0	3.5	1.8
Subtotal	74.6	317.3	180.4	515.2	230.1	248.1	268.9	306.1	294.1	280.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	4.7	0.0	0.0	0.3	1.2	0.0	0.3
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	2.8	0.0	68.4	8.4	10.5	16.9	26.4	11.8	17.4
Mergansers	62.8	144.6	158.0	118.9	171.4	115.5	125.0	147.3	104.4	130.4
Subtotal	62.8	147.4	158.0	192.0	179.8	126.0	142.2	174.9	116.2	148.1
Total Ducks	228.2	657.8	569.0	926.7	593.8	648.4	727.4	740.1	721.5	764.9
Canada Goose	34.2	1.8	16.2	22.8	33.4	25.4	22.7	13.1	12.7	26.0
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	1.9

Appendix 1 continued. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Western Ontario.

Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Ducks										
Dabblers										
Mallard	238.4	242.5	246.8	251.1	255.2	259.0	262.3	265.1	267.5	269.7
Am. black duck	25.6	25.5	25.4	25.4	25.4	25.4	25.5	25.5	25.5	25.5
Gadwall	1.9	1.9	1.9	1.9	1.8	1.7	1.6	1.5	1.3	1.2
Am. wigeon	32.0	32.8	33.6	34.3	34.8	35.0	35.0	34.7	34.3	33.8
Am. green-winged teal	27.4	29.0	30.6	32.4	34.2	36.0	37.9	39.7	41.5	43.2
Blue-winged teal	15.0	16.7	18.3	20.0	21.5	22.9	24.2	25.3	26.3	27.1
N. shoveler	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	2.9
N. pintail	2.8	2.7	2.6	2.6	2.5	2.4	2.2	2.1	1.9	1.7
Subtotal	344.3	352.4	360.9	369.3	377.3	384.6	391.1	396.5	401.0	405.0
Divers										
Redhead	1.0	1.0	0.9	0.9	0.8	0.7	0.6	0.4	0.2	0.0
Canvasback	5.6	5.5	5.4	5.3	5.2	5.1	5.0	4.9	4.8	4.7
Scaups	90.6	90.7	90.8	90.9	91.1	91.3	91.6	91.9	92.3	92.7
Ring-necked duck	59.4	62.7	65.9	69.1	72.3	75.5	78.6	81.7	84.8	87.8
Goldeneyes	102.5	102.8	103.1	103.4	103.6	103.7	103.8	103.9	103.9	103.8
Bufflehead	23.0	23.5	24.1	24.7	25.3	25.8	26.3	26.6	26.8	26.9
Ruddy Duck	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.4
Subtotal	283.9	287.9	291.9	295.9	299.9	303.8	307.5	311.0	314.3	317.4
Miscellaneous										
Oldsquaw	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	17.2	17.0	16.9	16.7	16.5	16.3	16.0	15.5	15.0	14.2
Mergansers	132.3	134.3	136.3	138.4	140.5	142.7	144.9	147.1	149.3	151.6
Subtotal	149.9	151.7	153.5	155.4	157.4	159.3	161.2	162.9	164.6	166.1
Total Ducks	778.1	792.0	806.3	820.7	834.6	847.7	859.7	870.4	879.9	888.5
Canada Goose	27.2	28.4	29.6	30.9	32.2	33.6	35.0	36.5	38.0	39.6
Am. coot	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.6	4.8

Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Ducks										
Dabblers										
Mallard	271.9	207.0	256.1	490.8	421.4	416.1	237.9	351.0	255.9	237.8
Am. black duck	25.6	11.0	17.3	24.6	15.5	18.3	27.4	24.3	52.2	49.9
Gadwall	1.1	0.0	1.8	1.8	3.5	0.0	0.0	0.0	3.5	0.0
Am. wigeon	33.3	0.0	6.6	36.5	44.8	23.2	33.2	36.5	33.2	36.5
Am. green-winged teal	44.8	27.0	2.5	63.9	50.4	66.4	24.6	32.0	55.9	46.6
Blue-winged teal	27.8	0.0	0.0	0.0	30.0	24.0	24.0	18.0	95.9	12.0
N. shoveler	3.1	2.0	2.0	0.0	2.0	4.1	6.1	0.0	0.0	0.0
N. pintail	1.4	0.0	3.1	0.0	0.0	4.6	0.0	0.0	0.0	0.0
Subtotal	408.9	247.0	289.4	617.6	567.7	556.6	353.2	461.8	496.6	382.9
Divers										
Redhead	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0
Canvasback	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	93.0	158.0	83.3	77.0	144.8	162.1	193.7	171.5	36.3	27.6
Ring-necked duck	90.8	26.9	6.7	76.0	64.4	75.0	81.8	106.8	161.5	200.6
Goldeneyes	103.6	79.7	128.9	111.1	136.3	77.6	36.7	38.8	183.8	104.0
Bufflehead	27.0	12.2	12.9	28.3	15.4	20.6	23.2	19.3	34.7	11.6
Ruddy Duck	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	320.4	276.8	231.9	292.4	361.0	337.9	335.3	336.4	416.3	343.8
Miscellaneous										
Oldsquaw	0.3	0.0	1.2	0.0	0.0	0.0	0.0	0.0	1.1	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	13.3	2.9	1.7	18.9	1.7	2.5	0.0	2.5	8.9	11.4
Mergansers	153.9	101.1	127.0	156.6	138.1	105.5	111.1	180.9	209.8	305.9
Subtotal	167.5	104.0	129.8	175.5	139.8	108.0	111.1	183.4	219.8	317.3
Total Ducks	896.8	627.9	651.1	1085.6	1068.4	1002.6	799.5	981.7	1132.7	1044.0
Canada Goose	41.2	47.7	35.8	75.5	67.5	74.7	58.8	53.2	46.1	67.5
Am. coot	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 1 continued. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Western Ontario.

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ducks									
Dabblers									
Mallard	274.7	469.0	127.6	267.9	138.9	160.7	102.1	241.8	443.8
Am. black duck	40.7	21.8	4.7	35.7	30.9	23.3	18.8	45.4	23.9
Gadwall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5
Am. wigeon	7.1	18.4	15.2	0.0	19.2	10.3	11.0	5.4	2.7
Am. green-winged teal	12.3	113.0	76.9	13.7	7.8	27.6	14.0	63.5	39.6
Blue-winged teal	19.3	21.8	4.3	6.7	2.7	0.0	0.0	0.0	6.0
N. shoveler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N. pintail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	354.1	644.0	228.7	324.1	199.4	221.9	145.8	356.0	519.5
Divers									
Redhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	4.9	17.2	13.3	32.8	1.8	0.0	14.1	4.6	0.0
Ring-necked duck	257.0	240.0	319.8	406.7	140.2	341.4	163.2	580.9	350.5
Goldeneyes	23.5	702.9	171.2	108.6	226.3	393.7	73.2	129.9	42.9
Bufflehead	6.9	31.4	12.5	11.5	10.9	28.2	12.5	20.8	7.2
Ruddy Duck	0.0	10.4	0.0	0.0	4.6	0.0	0.0	0.0	0.0
Subtotal	292.3	1002.0	516.7	559.5	383.7	763.3	263.0	736.2	400.7
Miscellaneous									
Oldsquaw	0.0	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	82.2	95.6	0.0	13.3	0.0	0.0	23.2	3.8
Mergansers	224.6	510.8	442.8	120.9	95.1	278.8	322.5	580.0	666.6
Subtotal	224.6	606.4	538.5	120.9	108.4	278.8	322.5	603.2	670.4
Total Ducks	871.0	2252.3	1283.9	1004.5	691.5	1264.0	731.4	1695.4	1590.5
Canada Goose	82.6	34.4	49.3	31.9	16.3	86.8	31.5	63.3	47.1
Am. coot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

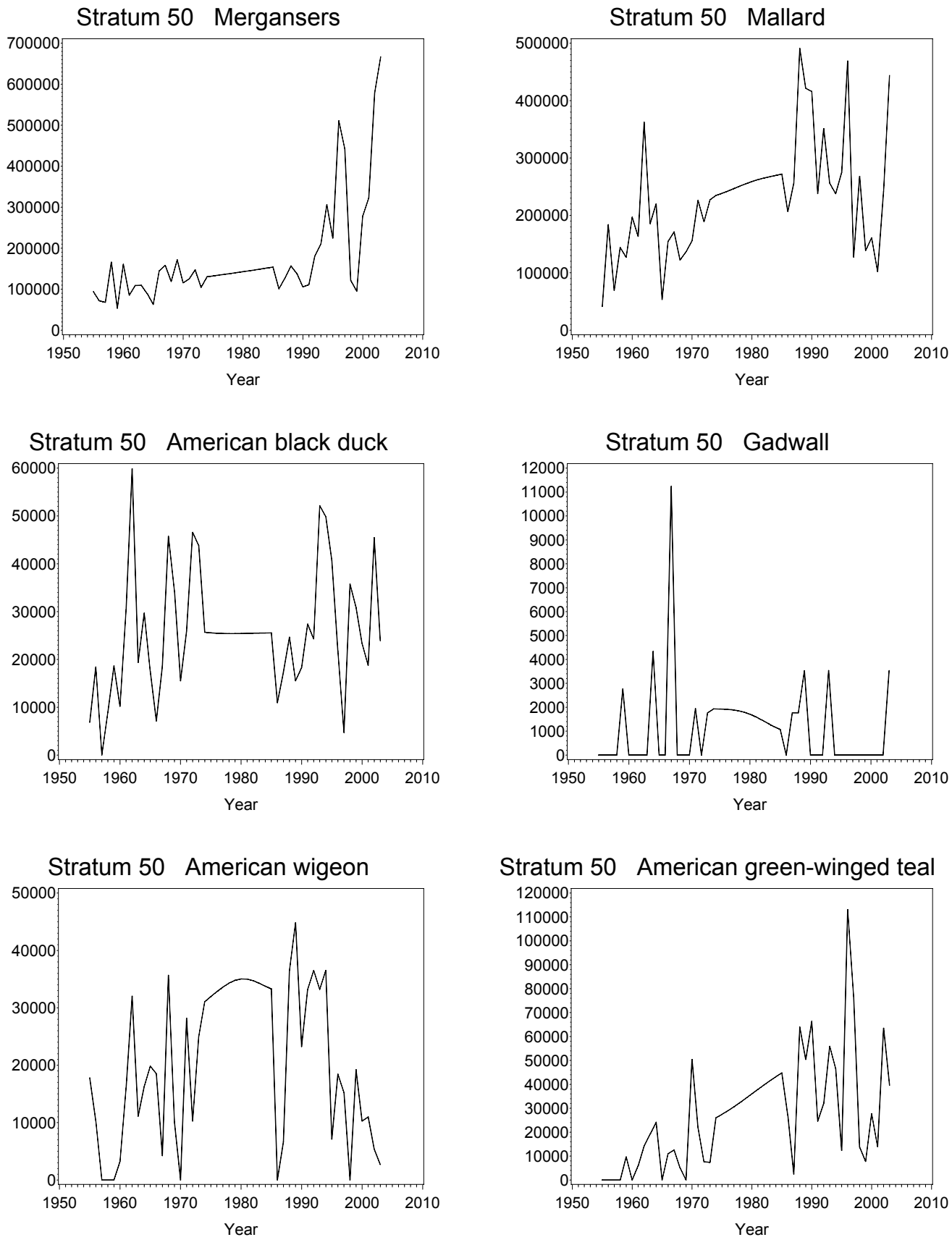
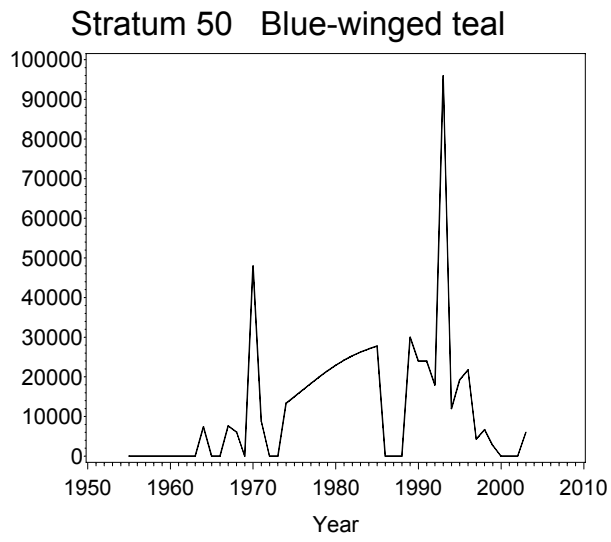
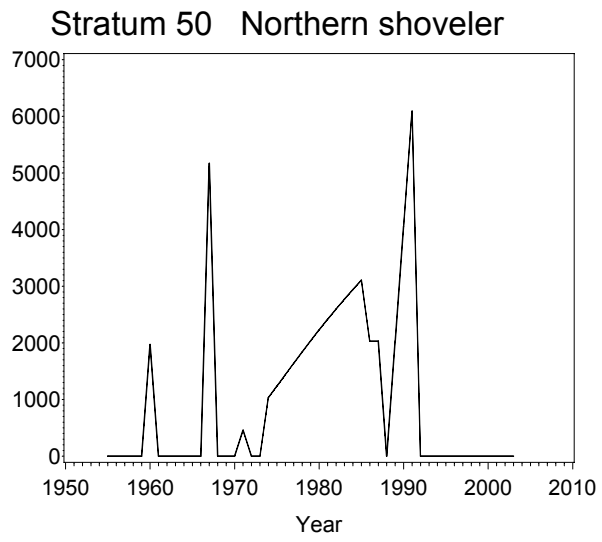
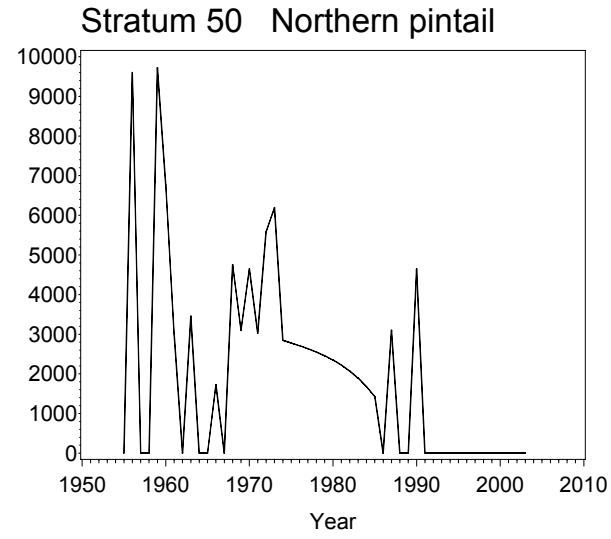
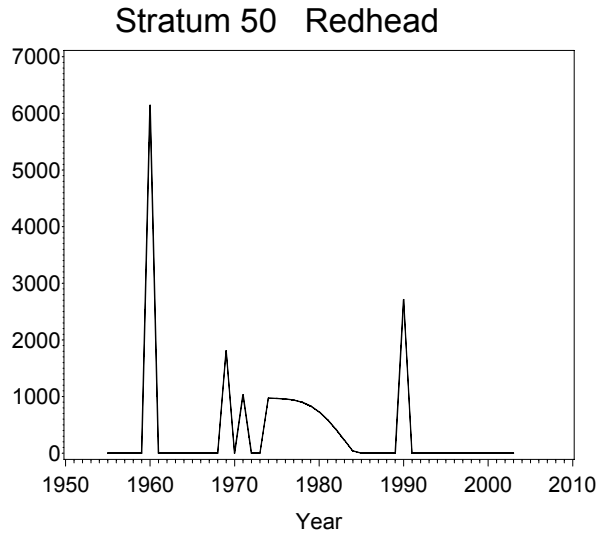


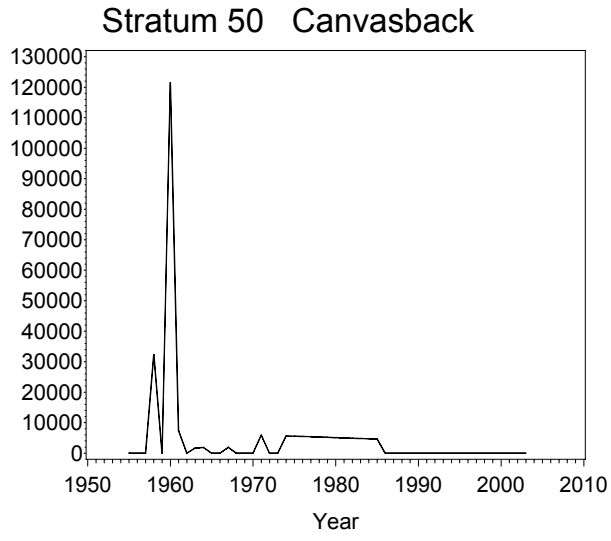
Figure 1. Population estimates for the individual waterfowl species on an annual basis.











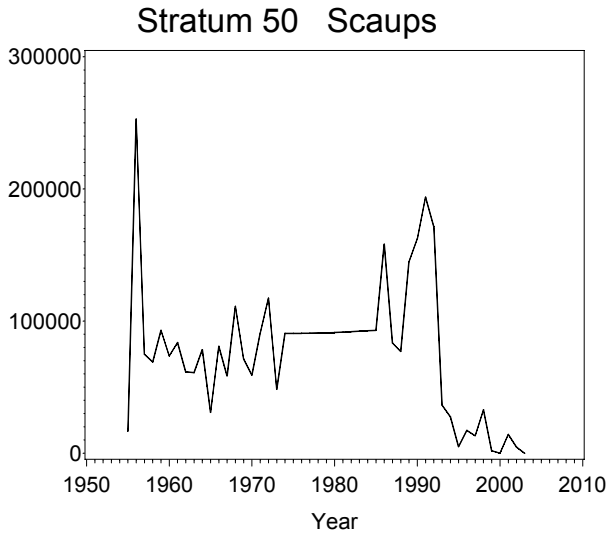
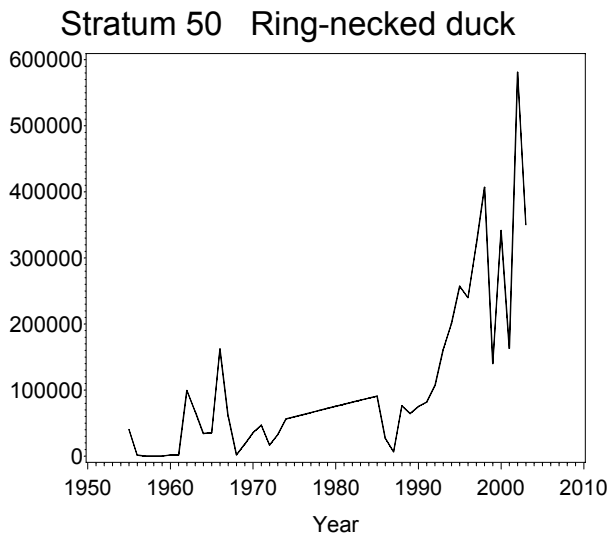
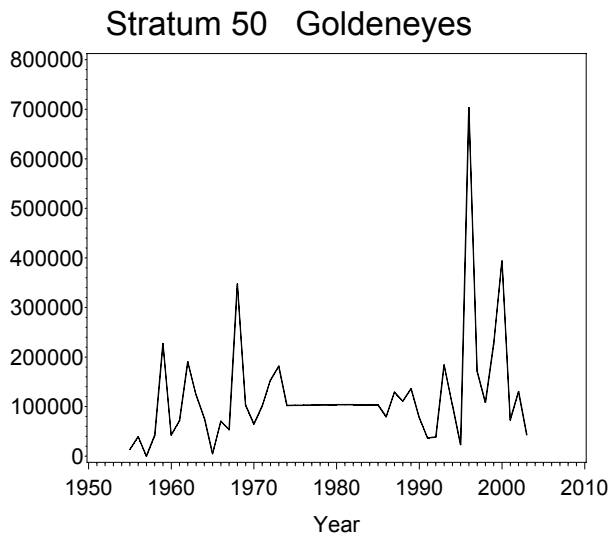
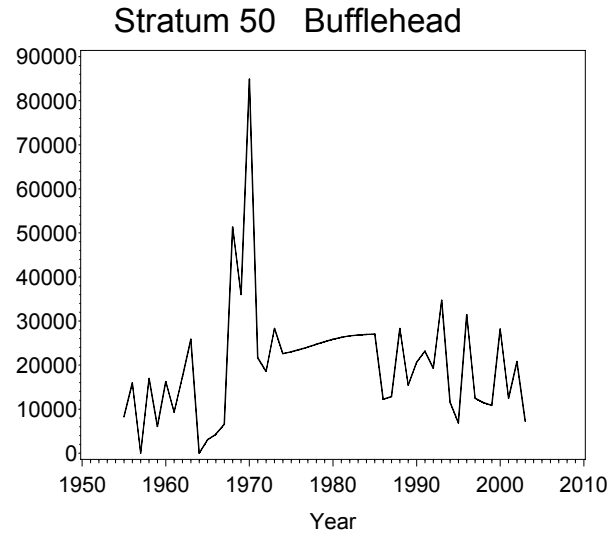
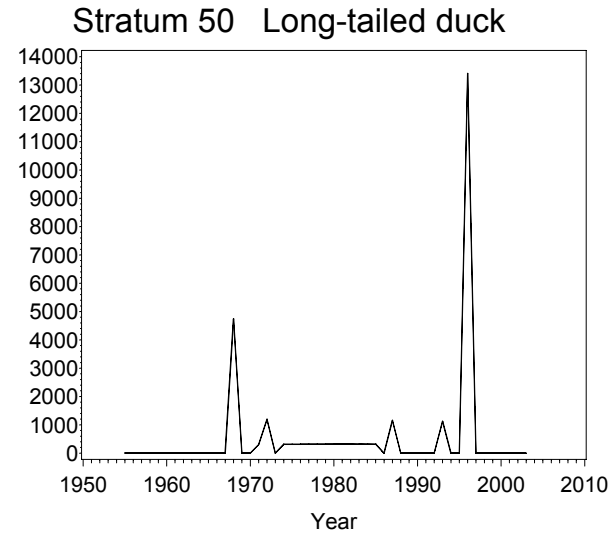


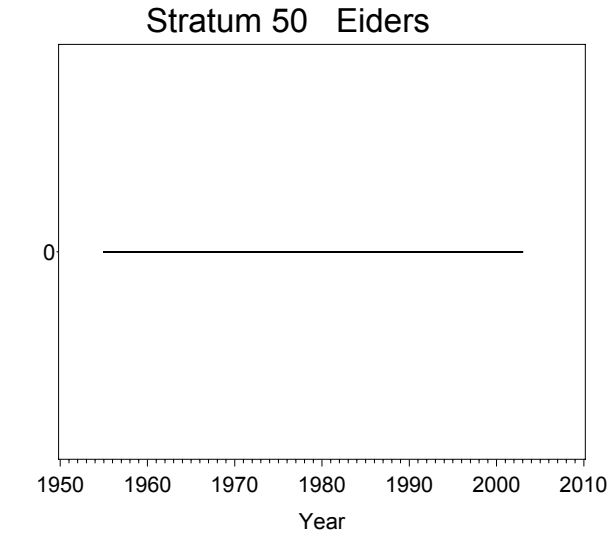
Figure 1 continued.











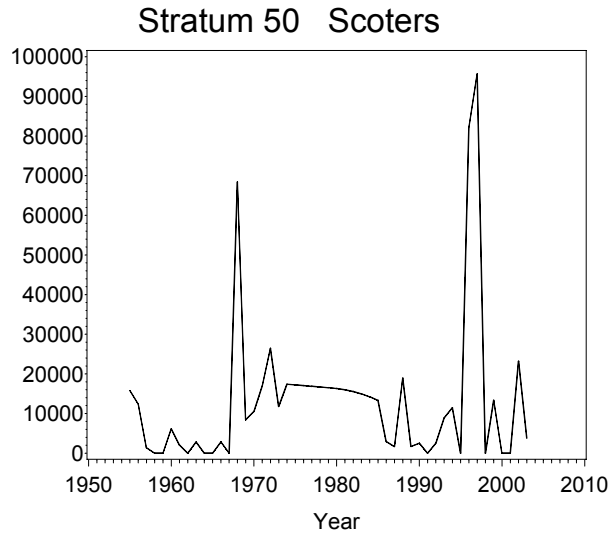
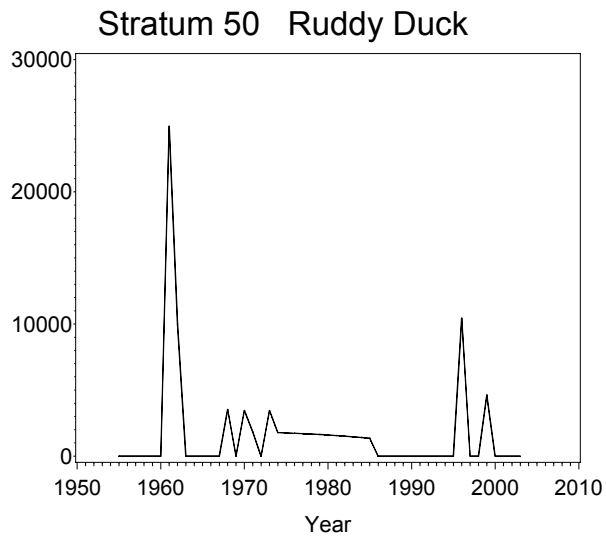
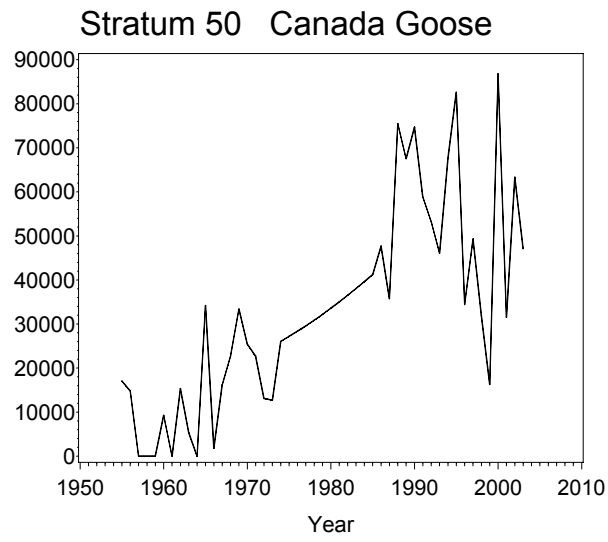
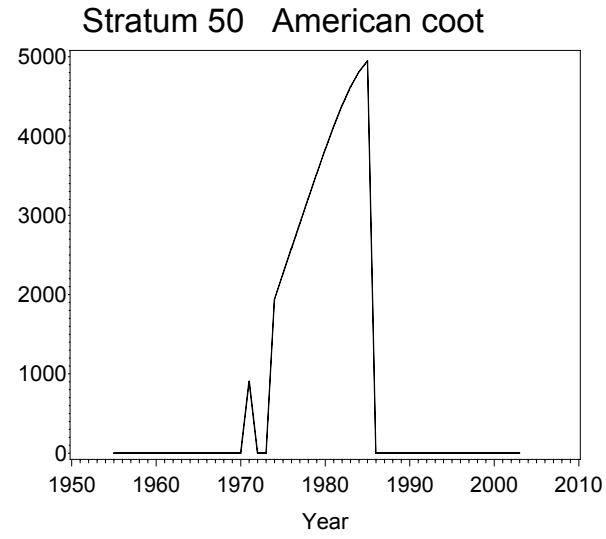
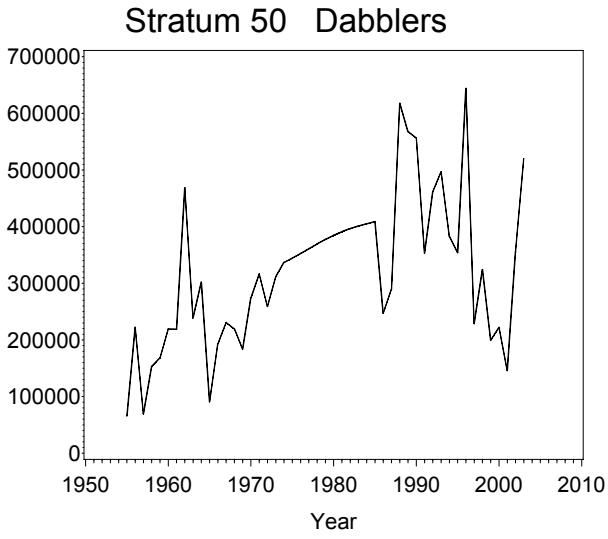


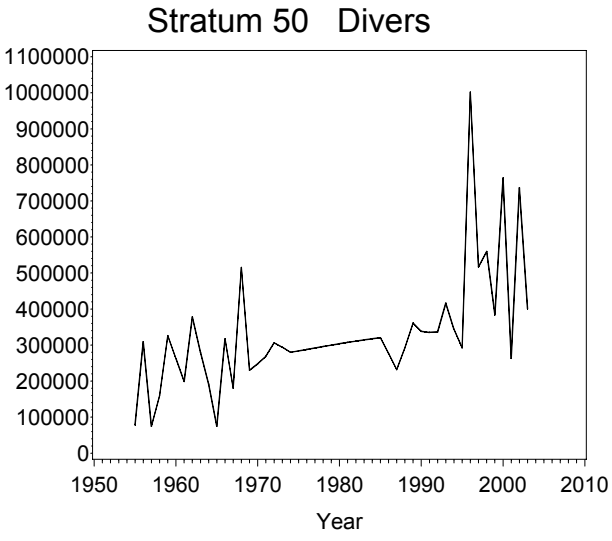
Figure 1 continued.











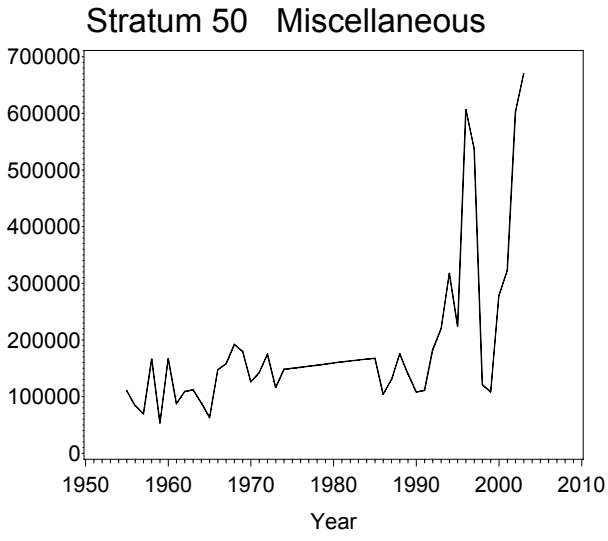


Figure 1 continued.

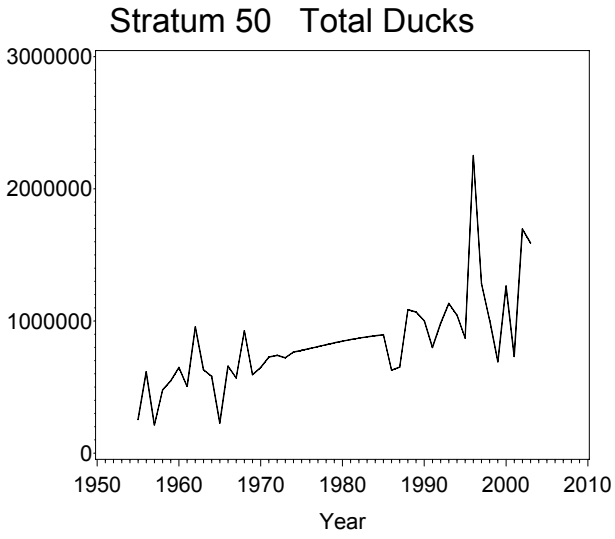


Figure 1 continued.

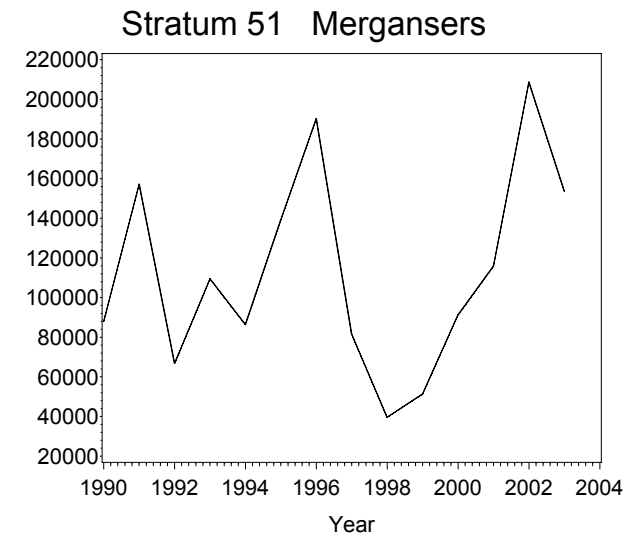
Table 3. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) bias species and stratum, with comparisons against the previous year and the long-term mean for Central Ontario.

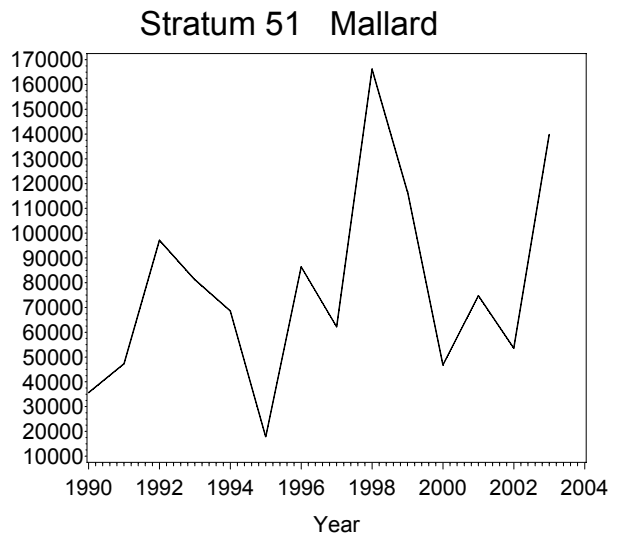
	Stratum			% Change From		
Species/Ponds	51	2003 Total	2002 Total	1990-2002 Mean	2002	1990-2002 Mean
Ducks						
Dabblers						
Mallard	139.8	139.8	53.6	73.4	160.6%	90.4%
Am. black duck	41.1	41.1	33.1	55.7	24.1%	-26.3%
Gadwall	0.0	0.0	0.0	0.1	--	-100.0%
Am. wigeon	1.9	1.9	3.8	6.7	-50.0%	-71.5%
Am. green-winged teal	21.5	21.5	19.5	34.0	10.0%	-36.8%
Blue-winged teal	0.0	0.0	0.0	4.2	--	-100.0%
N. shoveler	0.0	0.0	0.0	0.1	--	-100.0%
N. pintail	1.1	1.1	0.0	0.0	--	--
Subtotal	205.4	205.4	110.1	174.3	86.5%	17.9%
Divers						
Redhead	0.0	0.0	0.0	0.0	--	-100.0%
Canvasback	0.0	0.0	0.0	0.0	--	--
Scaups	0.0	0.0	19.0	12.1	-100.0%	-100.0%
Ring-necked duck	92.7	92.7	133.8	124.9	-30.7%	-25.8%
Goldeneyes	24.4	24.4	87.8	94.0	-72.2%	-74.0%
Bufflehead	4.9	4.9	14.0	17.1	-65.0%	-71.4%
Ruddy Duck	0.0	0.0	13.6	1.0	-100.0%	-100.0%
Subtotal	122.0	122.0	268.2	249.3	-54.5%	-51.1%
Miscellaneous						
Long-tailed duck	0.0	0.0	0.0	1.6	--	-100.0%
Eiders	0.0	0.0	0.0	0.0	--	--
Scoters	0.0	0.0	0.0	2.4	--	-100.0%
Mergansers	152.2	152.2	208.6	109.6	-27.1%	38.8%
Subtotal	152.2	152.2	208.6	113.7	-27.1%	33.9%
Total Ducks	479.6	479.6	587.0	537.2	-18.3%	-10.7%
Canada Goose	39.5	39.5	15.1	9.9	161.5%	297.1%
Am. coot	0.0	0.0	0.0	0.1	--	-100.0%

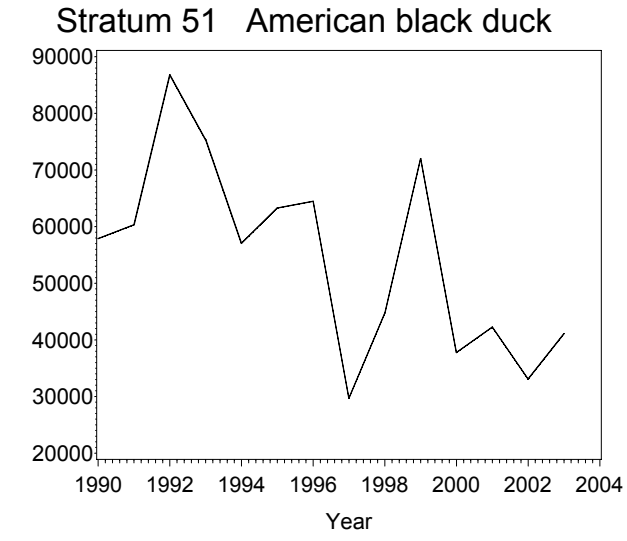
Appendix 2. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Central Ontario.

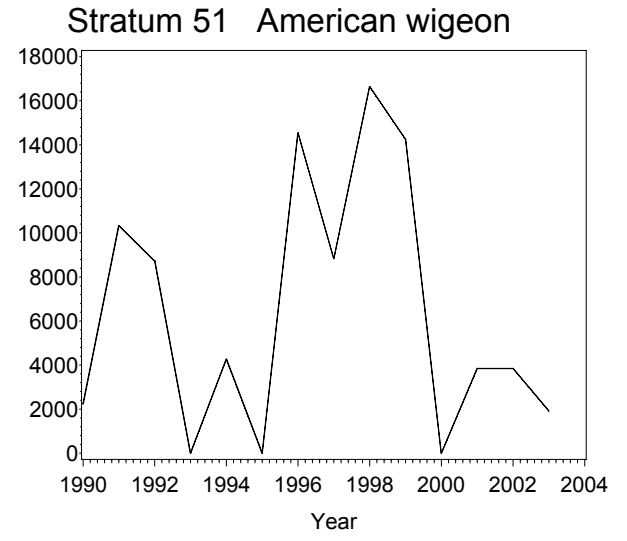
Species/Ponds	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Ducks										
Dabblers										
Mallard	35.6	47.3	97.1	81.2	68.6	17.9	86.4	62.2	166.2	116.8
Am. black duck	57.9	60.3	86.8	75.4	57.1	63.3	64.5	29.7	44.7	72.0
Gadwall	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Am. wigeon	2.2	10.3	8.7	0.0	4.3	0.0	14.5	8.8	16.6	14.3
Am. green-winged teal	18.3	20.5	24.6	25.4	62.3	51.8	74.4	53.5	38.5	16.3
Blue-winged teal	9.5	3.7	24.7	6.2	3.0	6.9	0.0	0.0	0.0	0.0
N. shoveler	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N. pintail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	125.1	142.1	243.2	188.1	195.3	139.9	239.8	154.2	266.0	219.3
Divers										
Redhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	0.6	1.7	2.7	1.8	1.5	0.0	0.0	6.5	7.8	0.0
Ring-necked duck	41.7	113.3	145.7	184.3	64.7	101.5	192.4	171.2	114.8	173.7
Goldeneyes	59.3	117.9	141.4	67.5	44.3	3.6	115.1	62.0	44.7	276.5
Bufflehead	41.5	53.9	16.6	4.1	6.8	0.0	21.6	11.0	11.8	21.1
Ruddy Duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	143.0	286.8	306.4	257.8	117.3	105.1	329.1	250.7	179.1	471.3
Miscellaneous										
Oldsquaw	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	1.9	5.6	2.1	0.0	18.3	0.0	0.0	3.2	0.6	0.0
Mergansers	88.0	157.1	66.8	109.5	86.4	139.2	190.2	81.4	39.6	51.4
Subtotal	100.5	162.8	68.9	109.5	104.7	139.2	190.2	84.7	50.6	51.4
Total Ducks	368.6	591.6	618.5	555.4	417.4	384.3	759.1	489.6	495.7	742.0
Canada Goose	1.8	8.1	11.5	10.2	10.0	7.6	13.8	10.6	8.5	15.4
Am. coot	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

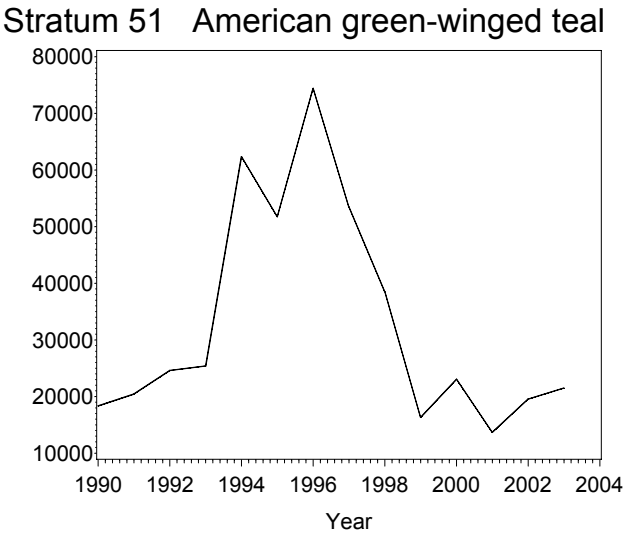
Species/Ponds	2000	2001	2002	2003
Ducks				
Dabblers				
Mallard	46.8	74.8	53.6	139.8
Am. black duck	37.8	42.2	33.1	41.1
Gadwall	0.0	0.0	0.0	0.0
Am. wigeon	0.0	3.8	3.8	1.9
Am. green-winged teal	23.0	13.7	19.5	21.5
Blue-winged teal	0.0	0.0	0.0	0.0
N. shoveler	0.0	0.0	0.0	0.0
N. pintail	0.0	0.0	0.0	1.1
Subtotal	107.6	134.5	110.1	205.4
Divers				
Redhead	0.6	0.0	0.0	0.0
Canvasback	0.0	0.0	0.0	0.0
Scaups	0.0	115.4	19.0	0.0
Ring-necked duck	102.4	84.4	133.8	92.7
Goldeneyes	155.7	46.5	87.8	24.4
Bufflehead	10.4	10.0	14.0	4.9
Ruddy Duck	0.0	0.0	13.6	0.0
Subtotal	269.2	256.2	268.2	122.0
Miscellaneous				
Oldsquaw	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0
Mergansers	91.3	115.9	208.6	152.2
Subtotal	91.3	115.9	208.6	152.2
Total Ducks	468.1	506.7	587.0	479.6
Canada Goose	9.1	7.6	15.1	39.5
Am. coot	0.0	0.0	0.0	0.0











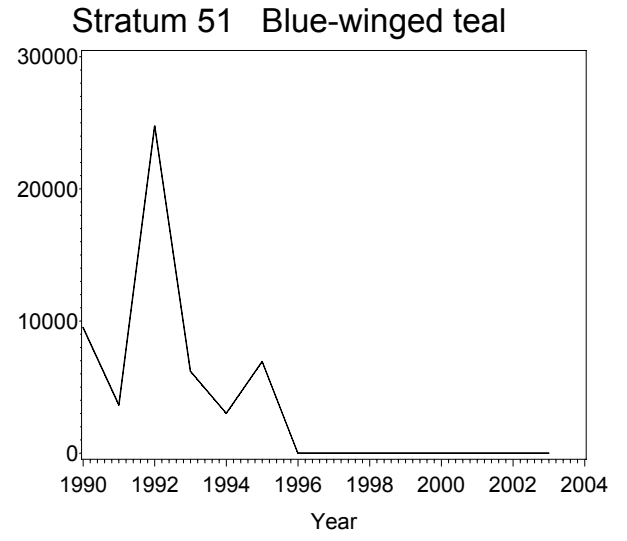
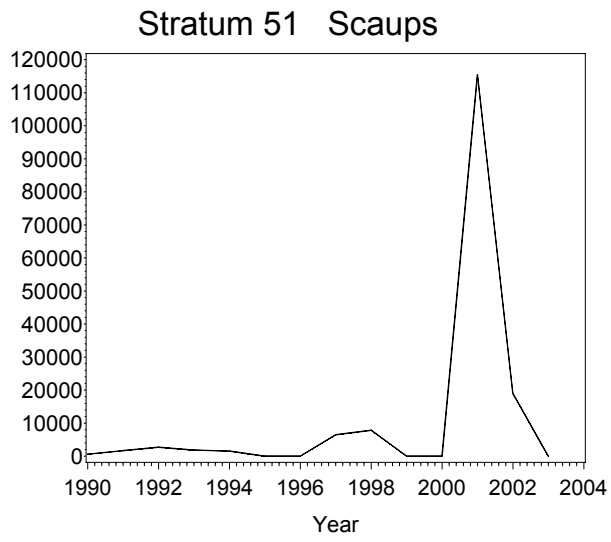
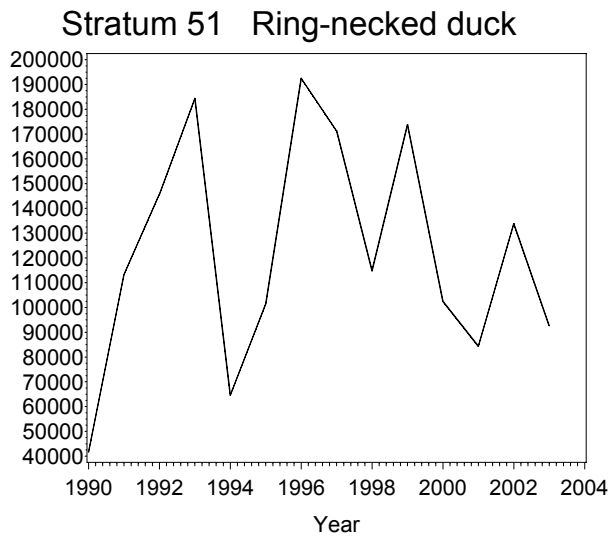
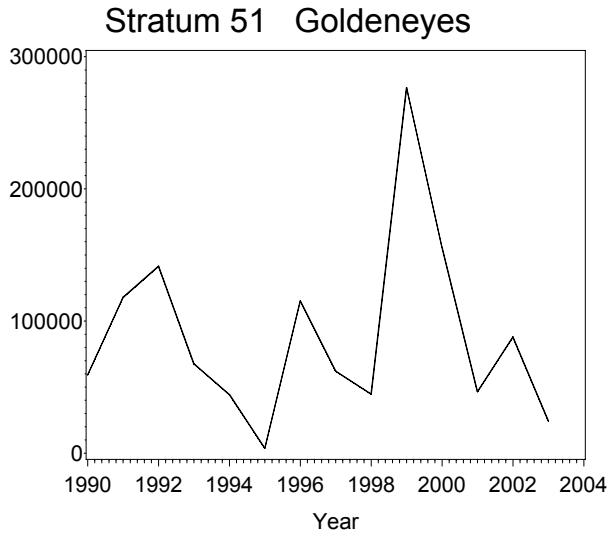
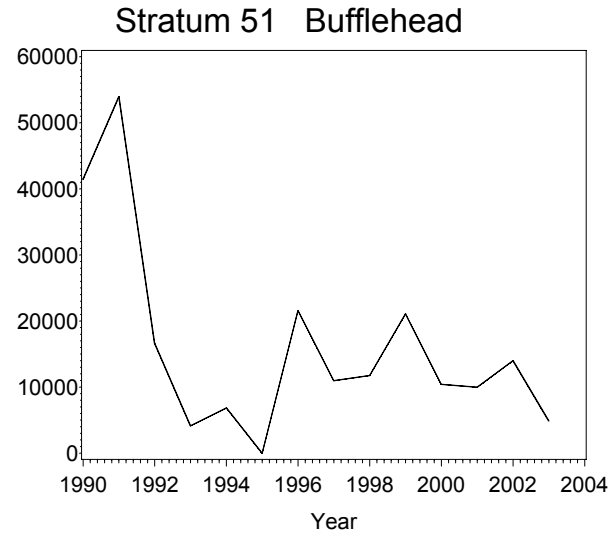


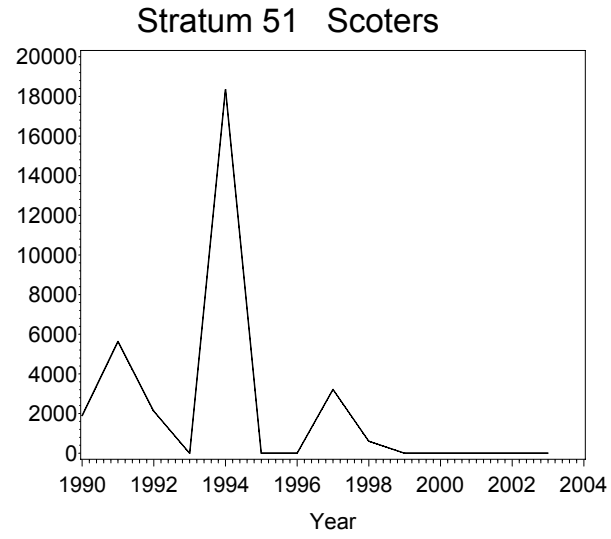
Figure 2. Population estimates for the individual waterfowl species on an annual basis.











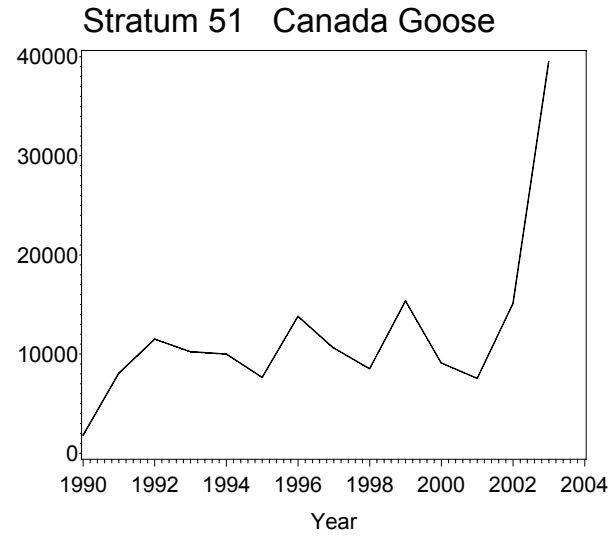
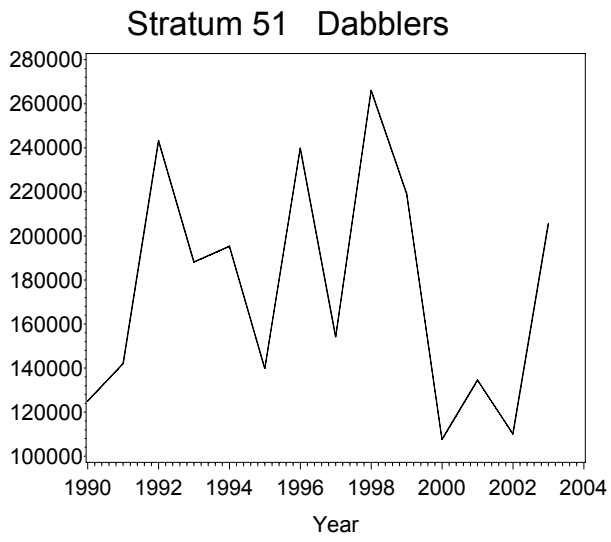
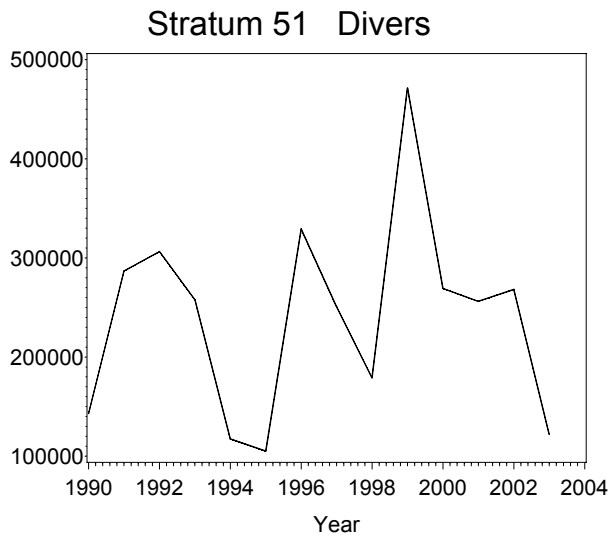
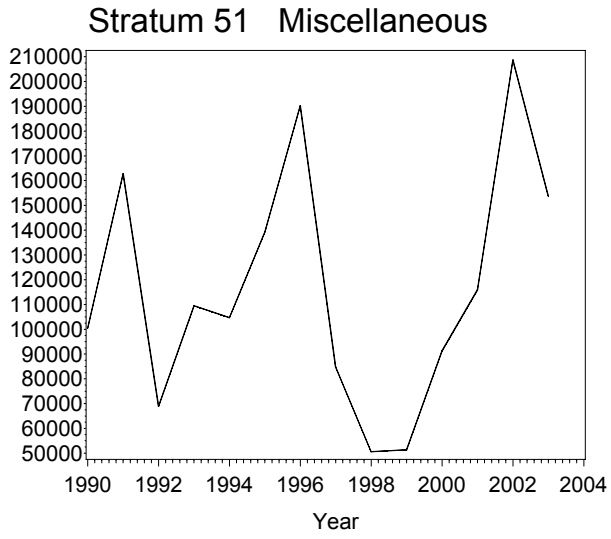


Figure 2 continued.







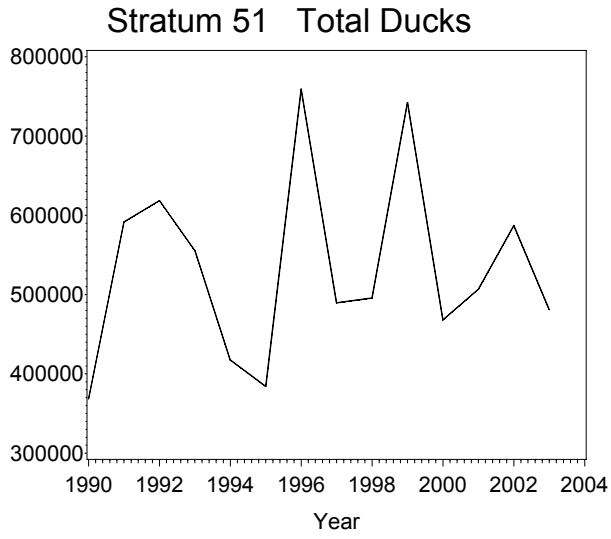


Figure 2 continued.